

THE INFLUENCE OF GEOGRAPHICAL AND PHYSICAL ATTRIBUTES ON USER ACTIVITIES IN ERBIL SQUARE, IRAQ

Omar Hussein Ali¹, Nor Haslina Ja'afar^{1*} and Mohd Khairul Azhar Mat Sulaiman¹

¹Centre of Innovative Architecture & Built Environment (SErAMBI),
Architecture Programme, Faculty of Engineering and Built Environment,
Universiti Kebangsaan Malaysia

* Corresponding author:
mell_ina@ukm.edu.my

ABSTRACT

Urban squares, also known as public open spaces, are places where everyone with any social status can visit. Such spaces are recognised and identified as the heart of the cities. In Iraq, the square is not as dominant as a street such as 'souq', maybe because of the geographical factors such as weather and the design aspect. This shows the need for a study to examine the square function and try to understand its compatibility and suitability in the Iraqi context. Thus, this research aims to determine the influence of critical design attributes pertaining to the geographical and physical aspects of urban square design on user activities in Erbil Square. The study site, Erbil Square, is in the heart of Erbil City, north of Iraq. The study adopted a quantitative method of questionnaire survey as the primary tool. The pilot survey used a sample size of 34 square users as respondents. Quantitative analysis employed the descriptive statistics to interpret the important aspects influencing the user activity index. The results revealed a positive relationship between geographical and physical as design factors and user activities. Moreover, the literature review and pilot study have exposed the need to focus on design policies and strategies in the Iraqi urban context. Thus, designers should take note of the square element designs that generate activity in the Iraqi context for designing a new square.

Keywords: : User activity, urban square, erbil, physical attributes, public space, geographical attributes.

1. INTRODUCTION

Urban space has contrasting definitions based on considerations such as title, management, entry, and usage. Some authors define it as 'space that is not controlled by private individuals or organisations and hence is open to the general public' (Madanipour, 1996). The presence of an urban square is essential to public lives, especially in high-density metropolises such as Erbil. However, urban square design is reported as mostly unsuccessful in serving the users' needs. Carr et al. (1992), for example, stated that urban squares are often created for commercial and recreational reasons and are thus used for promotional purposes. However, Cherulnik (1993) showed that designers and urban planners make excessive changes when considering the physical attributes of urban space design that daily users need. The present study is thus valuable in motivating urban designers to create successful urban spaces. Recently, we have witnessed how this balance has been deeply disturbed in numerous cities by factors such as increasing vehicle traffic (Gehl, 2007). The characteristics that affect people's needs in public places were discussed by Lang (2017), Madanipour (2007), and Maslow (1970), while the effect of environmental elements on losing the function of urban spaces as social interaction and recreational areas was discussed by Carmona et al. (2003) and Madanipour (2007). Numerous studies were carried out to investigate the lack of public space's redevelopment, the principle of efficient use, and the value of urban squares. However, a few scholars had integrated these concerns into one study. Moreover, most of the previous studies related to this research were based on situations in the western countries (Klingemann et al., 2018; Mehta, 2014; Van Hecke et al., 2016; Wang, Brown, & Liu, 2015). Thus, the objective of this study is to identify the essential design attributes for the geographical and physical aspects that influence urban square design on user activities in Erbil Square, Iraq.

2. Urban Square Attributes

2.1 Physical Attributes of the Urban Square

The physical aspects of urban squares involve the implementation and services offered to serve the daily needs of people. This aspect initially covers the form of the square, its size, and its visual complexity (Carmona, 2019; Moughtin, 2003). Kim (2017) in her study divided the urban space size into three types according to the ratio of depth to height D/H with regard to the influence of the size of urban squares, perceptions of the quality, and enclosure in urban spaces. These categories included three D/H ratios—2:1, 5:1, and 10:1. Form, like the size of the public space, should be in proportion to the dominant structures. Physical space as an expression is relevant to physical forms, cityscape, urban furniture, approachability, and landscape. Krier (1979) detailed the many options and variations in the shape of public space.

Activity denotes land use, patterns, pedestrian flow behaviour, and vehicle flow (Balsas, 2007). Urban squares are traditional places for individuals to meet and synthesise most kinds of public open spaces with differences in dimensions, shapes, and capabilities. These places can also be in parallel with pedestrian paths or with traffic routes (Jacobs, 1993; Krier, 1979). More importantly, urbaneness needs to be concerned about the pedestrians and offers the possibility for lingering activities. Among all types of urban squares, the most active spaces are those with many areas connected by short pedestrian paths that enable users to hang around or stroll (Shaftoe, 2008). People can also affect the shape of the urban square by doing these activities. Crowds on special occasions likewise shape the major gatherings in urban spaces (Askari & Soltani, 2018). The important feature of open spaces is openness and complete access. The openness must contain social and physical access via entry to the place and activities inside the urban square. An urban space devoid of complete and open access is not completely a public space (A Madanipour, 2004). Empirical studies (Hass-Klau, 1999; Mehta, 2014; Rapoport, 1990) indicated that a well-designed physical urban space for users, with enough seats and other space furniture, becomes valuable and meaningful for users when there are places for community events, a range of stores supporting activities, and other land uses. Public seating areas should be comfortable, visually pleasing, suitably located, and incorporate well-designed urban furniture (Pressman, 1994). Even for users who have seats and are not engaged in physical activities, public spaces should provide a sociable atmosphere and a simple feeling of security for those passing by, playing, as well as private seats from businesses like cafes that offer attractive destinations or rest stops for walkers (Chacón-Borrego, Corral-Pernía, Martínez-Martínez, & Castañeda-Vázquez, 2018; Hjort et al., 2018; Thompson, 2013). Seating

can also be part of the hard landscape in public spaces. Particular attention can be given to places with benches along with informal seating and leaning options, such as ledges, steps, and low walls (Shaftoe, 2008). However, these are not continuously available places to achieve at human scale through texture, patterns of the components, and elements with a size that makes up the floors, edges of urban space, and any of the above features as well as any fixed or portable components. The study by Douglas et al. (2017) proposed that providing sheltered places areas with interesting views will assist social interaction. Shade and protections can be shaped by tree canopies, awnings, overhangs, canopies, and other shading devices (Mehta & Bosson, 2018). A paved floor with a different material than its surroundings gives the place a very enclosed feeling and the look and feel of a corporate space (Mehta, 2014). Differences in the materials of the floorscape can also define the crossing and sitting areas of the urban space. Features of the urban space include the street, the sidewalk material and planting, space lighting, furniture, and public art (Yeang, 2000).

2.2 Geographical Attributes of Urban Square

The geographical aspects have a considerable impact on the shaping and physical growth of a city. A few studies have included the design and social characteristics and shown the improvement of criteria such as community access, aesthetic and attractiveness, and location of the urban space (Herbst & Herbst, 2006). Conventional accessibility studies were founded on location theory to reduce operational costs of service distribution and make substantial distance or nearness to the service as a critical variable in functional accessibility (Gregory, Johnston, Pratt, Watts, & Whatmore, 2011; Hass-Klau, 1999; Nicholls, 2001). Generally, urban squares serve their ideal purpose when they are reasonably in the centre of a neighbourhood or city and at the intersection of routes that people use for other functions. The Project for Public Spaces (PPS) (2008) found that urban squares are the most successful when they are located near the 'action', that is, where people can sit and watch other people. Geographers consider urban space access as a scale of the spatial distribution of facilities adjusted for the need and capability of users to overcome the distance or travel time to access the urban space (Giles-Corti et al., 2005). The accessibility and permeability of public spaces permit the interactions between workers, occasional visitors, and city residents, thus contributing to the liveability of the urban community (Pancholi, Yigitcanlar, & Guaralda, 2015). Alternatively, location accessibility and distance to transit are related to a more active journey (Cervero & Kockelman, 1997; Ewing & Handy, 2009). Urban connectivity between the neighbourhood and the urban square refers to the physical paths linking the open space with the surrounding parts of the neighbourhood. These paths are necessary for human activity.

Urban connectivity is easy and has direct physical connections between two or more urban spaces; it is related to the integration of urban spaces (Walker & Hiller, 2007). Spatial connectivity is the integration between urban spaces and between urban factors in the urban setting (Hillier, Burdett, Peponis, & Penn, 1987).

2.3 User Activities in Urban Square

Urban squares carry several and varied meanings depending on people's daily activities. What are the attributes that indicate a thriving urban space? Carr et al. (1992) suggested that an ideal urban space is reactive, substantial, and democratic. By contrast, the PPS describes a successful or high-quality space as one that addresses the issues of accessibility, activity and use, design element, and sociability. Such spaces are also easy to access, connected to the surrounding community, contain multiple activities for a variety of users, have adequate seating and, most importantly, act as venues for people to interact socially (PPS, 2008). Public spaces are destinations where activities take place and are connected with user activities. The aim of such a 'place' is for users to spend time in the public space and generate various activities such as observing. The physical aspects are essential because they determine the intangible aspects of people's behaviour or activity (Ja'afar, 2018).

The enjoyment of time in public spaces was mentioned in Worpole and Knox's (2007), who examined young people's perceptions on social variation. They found that young people could make friends and learn some of the rules of communal life and play in public spaces. The essential sub-categories that encourage visits to public spaces and performance of physical activities are accessibility by foot and public transport, location of the urban square that is close to home/work, the attendance of lively family and friends, and public space facilities (Van Hecke et al., 2016).

3. METHODOLOGY

The literature determined the selected variables of the physical and geographical attributes that impact user activities on urban space. The study captured and measured seven main aspects: location, accessibility, and connectivity of urban square as geographical attributes, as well as form, soft and hard landscape features, shelter and protection, and seating elements as physical attributes. This study implemented a quantitative methodology using data from the pilot study. The specific survey technique employed in this research was the cross-sectional survey using a questionnaire form supported by field observation. This study addressed the logical and constructed validity of the instrument. Some drafts were evaluated to increase the content

validity of the research instrument. Pilot research fulfils a variety of essential functions and can provide useful information for other researchers. Social science literature has unusually few sample size recommendations for pilot studies, given the popularity of the pilot. However, some relevant articles bring attention to the matter (Johanson & Brooks, 2010). The studies by Isaac & Michael (1995) and Hill (1998) suggest that sample size of respondents between 10 and 30 is suitable for pilot study with several concrete advantages, including simplicity, easy calculation, and the ability to test hypotheses, yet "overlook weak treatment effects" for pilots in survey research. Treece & Treece (1977) in their most recent and experimental research suggested that 10% of the project sample size is recommended. For this reason, empirical studies suggesting 30 typical participants from the population of interest are the reasonable minimum reference for a pilot study where the purpose is an initial survey or scale development (Hill, 1998; Johanson & Brooks, 2010). In addition, $N = 30-36$ is recognised as a reasonable sample size for bootstrapped confidence intervals for the pilot survey (Johanson & Brooks, 2010).

According to the explanation above, this study chose a sample size of 34 for pilot study, which fulfilled both samples as suggested by Treece and Treece (1977) and also Johanson and Brooks (2010). Besides, there are several papers that were published according to the pilot study (Guilbert et al., 2019; Nakau et al., 2013). This shows that the pilot data could be used for writing a journal. The 34 pilot sample size consists of questionnaire surveys on urban square users in Erbil, Iraq. The questionnaires used items with a five-point scale ("agree" and "disagree" statements). When researchers want to collect many attitudes in a short time, five-point agree-disagree items are typically the chosen method (Johns, 2005). The answers of the respondents are basically dispersed in a five-point scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). A panel of urban design and social science experts was selected to examine the instrument's logical validity. All items were translated into Arabic and Kurdish to enable the panel of experts to verify the format, organisation, suitability of information, language, and the content used in the tool. Cronbach's alpha coefficient was utilised to evaluate the reliability of the survey items. The data were analysed using mean and the essential variables in the range of 3 to 5 were determined for the mean score, where 3 represents the midpoint of the scale

4. STUDY AREA (THE LOCATION AND SELECTION)

The data shown in this research were collected at Erbil Square in Erbil City (population 932,800), northern Iraq. Erbil is the capital of the Erbil governorate and the Kurdistan Regional Government KRG. The location of

Erbil City impacts the city's urban development and economic growth, and it assists the city in enduring and maintaining its name throughout history (Houtsma, 1993, p. 521). The size and stability of the city make it a popular base for humanitarian organisations. Erbil Square is located in front of the Erbil Citadel (the landmark of Erbil City and a World Heritage Site) (see <https://whc.unesco.org/en/list/1437>). The current location of Erbil Square is at the same place with a traditional maidan (Public Square) from the 12th century (Figure 1). It is located in the south side of the Erbil Citadel, lower than its south gate, and reaches out towards the valley where the old cemetery is placed (Al-hashimi, 2016). Based on its location and the observations of the study area, Erbil Square was selected as the study area owing to several factors. Firstly, this urban space is a substantial public space in the city and is viewed as a safe place. Secondly, this square is easily accessed by main forms of transport and is an ideal place for people to meet, socialise, sit around and, if they so wish, walk around the city. The area also has commercial shops and other small individually owned or local stores which are part of the square. Therefore, Erbil Square is an urban space that is safe where people can congregate, sit, interact with other visitors, or walk around (Mehta, 2014).



Figure 1: Location maps of Erbil Square shows: (A) the location of square in the center of Erbil City. (B) Map of the square with the surrounding.

5. RESULTS

Data from the pilot survey were used to calculate the descriptive statistics using SPSS version 25. Table 1 shows that the two main user activity indexes were the number of visits to the urban square, with mean = 3.176 for responding to the four question items (1 = 1st time visiting the urban space, 2

= 2nd time visiting the urban space, 3 = 3rd time visiting the urban space, 4 = more than 3 times; see Figure 1). The standard deviation score was 1.028 for measuring the amount of variation in statistical conclusions, and the measures of skewness = 0.907 and kurtosis = 0.469 for checking the normal distribution of the data set. The second variable of the main user activity index was the ability to start communication and create friendship in the urban space, with mean = 0.558 as the average (with 0 = I don't have friends inside the urban square, and 1 = I have friends inside the urban square), the standard deviation score = 0.503 and the measures of skewness = -0.248 and kurtosis = 1.064 (Figure 2).

Table 1: The descriptive for a total mean score for the user activities

		Frequency Times for Visiting the Place	Have friends inside the Place
N	Valid	34	34
	Missing	0	0
Mean		3.176	0.558
Minimum		1.00	0.00
Maximum		4.00	1.00
Std. Deviation		1.028	0.503
Skewness		-0.907	-0.248
Kurtosis		-0.469	-1.064

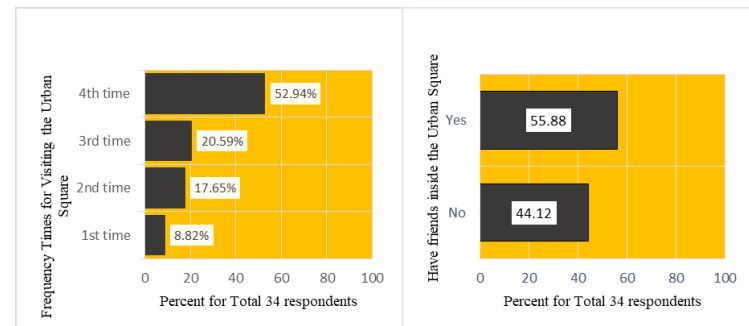


Figure 2 : For respondent Frequencies- Times for Visiting the Place (left). Have friends inside the Place (right)

(i) Physical Aspects

The measurements of the four selected physical aspects (form, hard and soft landscape, seating, shade and protection) are listed in Figure 3. Table 2 shows that form (mean = 3.75, std. deviation= 0.751) was rated the highest among the physical aspects and at more than mid-point, and hard and soft landscape (mean = 3.18, std. deviation= 0.650) was also at more than mid-point. These aspects were followed by seating elements (mean = 2.23, std. deviation= 0.975) at less than mid-point, while shade and protection (mean = 2.18, std. deviation= 1.281) was last with the least value among all the physical aspects.

(ii) Geographical Aspects

Table 2 shows the mean results of geographical aspects (mean = 3.98). The rating scale was five points (from strongly disagree to strongly agree). As shown in the table below, the location (mean = 4.84, std. deviation = 0.410) of the urban space was rated the highest among all the design aspects that affect social activities in the urban space, with many of the respondents indicating “strongly agree” (Figure 4). This item was followed by connectivity (mean = 4.05, std. deviation = 0.781), which was also a highly rated variable at more than mid-point. The finding showed that accessibility (mean = 3.76, std. deviation = 0.407) had the lowest mean in the geographical attributes but still at more than mid-point.

Table 2 : Total Mean Score for selected Design Attributes Based on a Pilot Survey

	N	Minimum	Maximum	Mean	Std. Deviation
Geographical Attributes	34	3.00	4.50	3.98	0.424
Location of urban square	34	2.00	5.00	4.84	0.410
Connectivity of urban square	34	1.50	5.00	4.05	0.781
Accessibility of urban square	34	1.00	4.33	3.76	0.407
Physical Attributes	34	2.33	4.00	2.98	0.560
Form of Urban Square	34	1.00	5.00	3.75	0.751
Soft & hard landscape	34	1.00	4.75	3.18	0.650
Seating elements	34	1.00	5.00	2.23	0.975
Shelter & Protection	34	1.00	5.00	2.18	1.281
Valid N (list-wise)	34				

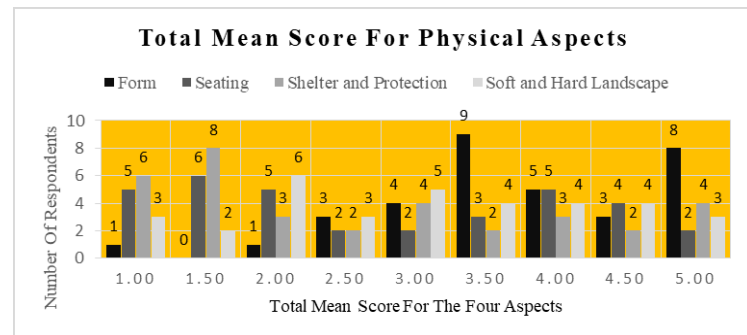


Figure 3: Total Score for the Respondent Answers on Physical Attributes

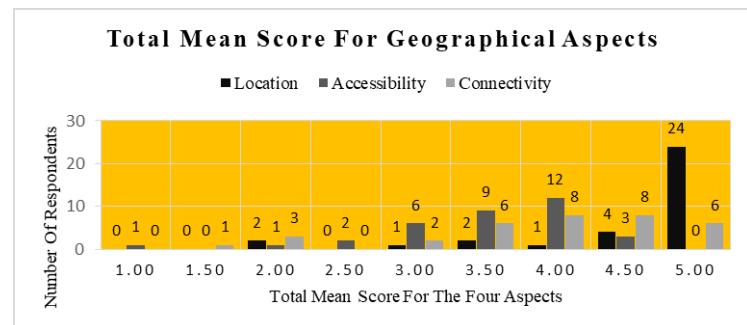


Figure 4: Total score for the respondent answers on Geographical attributes

6. DISCUSSION

The purpose of this study is to identify the essential design attributes for geographical and physical aspects that influence urban square design on user activities in Erbil Square, Iraq.

6.1 Physical Aspects

This study shows the importance of the form of the urban square which most of the respondents agreed that ‘the place is open’ (mean = 3.75). From the section, the study found that the ratio is 1:8 by which the square size could be categorized under a big size (Kim, 2017; Lynch & Hack, 1984). However, when the study compared shelter and protection attributes (mean = 2.18), it showed the lowest significant attributes with mean less than the midpoint. What is the relationship? This reveals that the size or square ratio is important to create a comfortable environment for users from the

weather. In other words, the form of the square itself is one of the important attributes which functions like shelter and protection via its shading. This comfortable environment is important because it will generate user activity. Another type of element that creates shades and increases user activity is tree canopy (Shaftoe, 2008). However, the weather of Erbil is not suitable for planting big canopy trees (Al-hashimi, 2016; Rasul, Balzter, & Smith, 2017). As mentioned by the researcher, the nature of public space is exposed to the weather (Rasul et al., 2017). This means that the appropriate type of public open space design should be considered. Thus, many scholars suggest referring back to the typology of urban form which encompasses its public open space (Lang, 2017). Therefore, if we reveal the typology of traditional public open urban spaces in Iraq, they are synonym with street concept such as 'souq' and small size of square (small ratio) (Almohannadi, Zaina, Zaina, & Furlan, 2015; Habibi, Farahmandian, & Mojdehi, 2016). The finding also supports that many urban square users go to the restaurants and coffee shops around the urban space when the weather is rainy or sunny. This means that the size of the square is too big; in addition, there is no big canopy plantation that could be planted in the Erbil climate. In other words, the big size of square through its ratio is not suitable in designing a square in Iraq. This is the reason why these 2 attributes revealed a contrasting result and how they relate to each other. To conclude, the form of the square via its appropriate size of ratio with the climate condition is a significant feature that will influence urban square design on user activities in Erbil Square, Iraq. This design element (form of the square via its appropriate ratio size) will create the main element of shelter and protection. This is an important contribution of the study where not all design elements from other countries with different weather and culture is suitable in Iraq. An appropriate ratio size will create a square with comfortable environment through the shading of its form. Thus, it will generate user activity during sunny day because being exposed to weather is a natural characteristic of a square as a public space. However, how we design to respond to climate in order to create shading via its ratio is important.

Another important study includes hard and soft landscape elements (mean = 3.18) like the materials of space floors and also various natural green areas and plants. This could be seen in study area; the big size of square is divided into multiple spaces for variety of user activities via different kinds of (i) vegetation such as a shrub and (ii) floor material design such as interlocking concrete, timber, glass, water, and grass (see Figure 6.). The design of these

elements create a variety of spaces and human activities such as a place for people to walk, sit, observe, chat, and conduct businesses. With respect to the big spaces, Moughtin (2003) also found that a surface with big spaces and material with decorative designs is able to create a human scale environment via the segmentation of the space, thus creating a human ratio. As added by Kim (2017), the same goes for plantation design which creates physical and visual barriers. This shows that a variety of hard and soft landscape design features will influence urban square design on user activities in Erbil Square, Iraq. The variety of types of vegetation and floor materials design will create a space, thus generating a diversity of user activities. This is because the space segments can create a human scale environment.

The explanation above also shows the important relationship between the form and also hard and soft landscape design attributes that influence urban square design on user activity, and they are the main physical aspects in urban space which influence people's needs (Carmona, Tiesdell, & Heath, 2003; Krier, 1979; Shaftoe, 2008; Whyte, 1980). As added by Lynch (1984), urban squares should provide places where users can do something of their own. That is why this study revealed the highest mean between form and also hard and soft landscape attributes. This portrays that the relation between the form of the square via its ratio size and the types of hard and soft landscape element will influence urban square design on user activities in Erbil Square, Iraq.

One of the strengths in this study is the similarity of results with the previous researches that used different approaches of different types of public space. Mehta (2014) used different measures for evaluating the 'liveliness' of the street in Boston. This study found that seating (types and design flexibility) score was not so significant (mean = 2.24) and did not have high effects on user attraction in the square. However, the study revealed that users can find additional seating from the private business inside and around the urban square. This kind of business can support the public organisation responsible for the facilities managed inside the public space. This result is parallel with Mehta's (2014) study. This shows another important contribution in a sense that different methods will yield the same result. As a result, seating attributes should consider that seating from the business inside and outside the building that faces the square will influence urban square design on user activities in Erbil Square, Iraq.

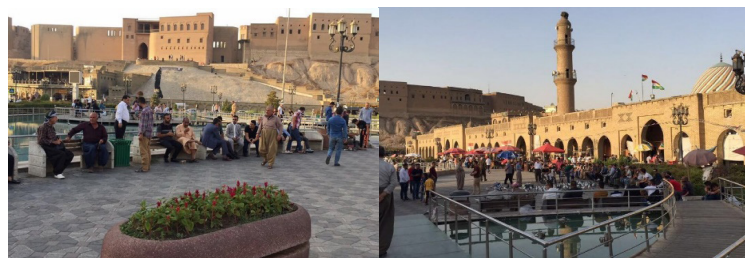


Figure 6. Picture of some Physical Aspect elements on Erbil square such as seating, hard & soft landscape features, and floorscape materials

6.2 Geographical Aspects

One of the important elements in any successful urban spaces in the city is strategic location (Askari & Soltani, 2018). For this reason, we understand why geographical aspects, especially location (mean = 4.84), has a greater impact on user activities in Erbil square. As mentioned in Figure 1, the section of the study area shows that the location of Erbil square is in the centre of the city of Erbil, in front of a historic citadel, and beside the traditional market. This shows that these nearby locations of important buildings function to provide an advantage to Erbil square which enhances its function as a node; a square as a public urban space through attracting people to meet and gather as assembly point. According to Askari and Sotani (2018), this will create a liveable square. In short, the great strategic location will influence urban square design on user activities in Erbil Square, Iraq. This location factor is important because it will enhance the function square as a public open space by considering the nearby important building functions, such as the market, where it will attract people to the square and gather as an assembly point. Thus, it will create a successful and liveable square and also enhance the square function as a node in the urban area.

The result showed that connectivity (mean = 4.05) also portrays a good impact along with the geographical aspects on user activities in the urban square through the direct movement between the buildings and the urban square and the level of all areas in the place. The direct connection between the building level and the urban space level will create a visual and physical linking between these places. The direct connection between any places will create a feeling of continuity through the absence of interrupted physical obstacle like steps; this inadequacy will create a sense of safety for the public. Dobbins (2009) highlighted the importance of the type of connection between civic spaces and their mixed-use activities, all of which should be clearly outlined.

Furthermore, this kind of connectivity will allow users to observe all parts of the urban space, reduce the sense of fairness from any negative activity inside the space, and improve the social interaction among people on the urban space areas. Hence, keeping the urban space in the same level with the surrounding as well as between the urban space parts can improve user activities through reducing the obstacle that affects the elderly and children who visit any public space or strolling around from the surrounding place to the urban space. In short, the connectivity will influence urban space design on user activities in Erbil Square, Iraq.

A good connectivity of the square design should be achieved by integrating visual and physical linking on urban space. An urban space with a permeating direct network can reduce the distance between the users. A clear path can provide a feeling of safety, improve the connectivity notably, and hence the usage.

The result portrayed that the accessibility (mean = 3.76) factor is the lowest part of the geographical aspects on user activities in the urban square. The types of accessibility could be divided into 3 main access which are by foot, public transportation, and private vehicles (Van Hecke et al., 2016). The location of the Erbil square makes the accessibility to reach it more easily for the public, especially for those on foot and those strolling from the surrounding building like the historic place and the markets. The entrance access positions are connected with the nearby axes like the traditional market, citadel entrance, and transportation and parking zones. The observation showed that the south and the east entrances are the most used paths; the reason behind this comes from the fact that these two entrances have a direct connection with the pedestrian paths around the urban space. These are the pedestrian streets and this direct connection develops into a new shape as commercial areas for street vendors and improves the space activity (see Figure 7.). This access is active with people's activities such as walking and talking, and it allows users to move between the urban space and the traditional market as well as the Erbil citadel safely. This environment causes the vehicle movement to slow down the speed during most of the daytime.

However, the west and north entrances are separated from the surrounding by automobile roads where the vehicle movement is fast; thus, it is difficult for pedestrians to cross the street. The observation exposed that the width of the street is wide and the access points within this axis do not have "pedestrian cross areas", and this can affect user safety, attendance, as well as the activity on the urban space, thus creating unfriendly pedestrian environment. According to Ja'afar et al. (2017), these environments occur because cars are given priority in terms of design where the high speed (60km/p) is not

parallel with the pedestrians' which is low, 5km/p. Such speed difference without connectivity by "pedestrian cross areas" will make it unsafe for the pedestrians to cross the street; thus, it would reduce the number of people coming to the place (Ja'afar et al., 2017).

In addition, Erbil square is not accessible for public transportation because there is no nearby stop. Thus, people depend on cars to go to Erbil square. This will increase the volume of private vehicles and the space of facilities. Chen and Chang (2015) coined that public transportation accessibility is essential because it would increase more volume of pedestrians to visit the place.

The findings also disclosed that the car park is not sufficient and people are forced to park their vehicles far from the urban square. Most of the people who visit the Erbil square are depending on their private transportation and public transportation is not enough to cover the whole area around the urban square. Moreover, many users come over to Erbil square from all around the city and from other cities of Iraq. The observation also found that there is lack of pedestrian facilities such as continuity sidewalk and shades surrounding the square. Thus, this has increasingly caused users to depend on private vehicles. The effect of this finding on people's attendance is similar to the pattern observed by Chen and Chang (2015), hence supporting the goal of increasing public transportation for improved accessibility. Heavily depending on car or private vehicles with a reduced service of public transportation is the reason why the accessibility attributes showed a lower result. As a result, accessibility attributes, especially by foot and good public transportation service will influence urban square design on user activities in Erbil Square, through increasing the facilities and space for the pedestrians and public transportation. They have an added advantage through providing a facility for private vehicles as the last hierarchy of accessibility. This type of accessibility design will increase the number of pedestrians coming to the square.



Figure 7. Shows vender areas on the east (left) and south (right) side supports commercial and social activities on urban square.

7. CONCLUSION

This study investigates the most critical design attributes affecting people's needs for urban square in Erbil, Iraq. The results from the study may be used as a foundation for urban square design in Iraq. The findings have revealed features of design attributes that affect people's requirements in urban squares. The literature review and pilot survey have uncovered a weakness in the focus on strategies and plans in urban design. Consequently, guidelines must be established based on the design attributes that are associated with fulfilling people's needs. The findings lead to the recommendation that the increased focus be directed to specific design attributes of urban squares when designing urban open public spaces. These attributes include a place of accessible path, location and connectivity, proportion, and materials for visual elements like seating and paving, and the distribution of green area inside the urban square. This study has put a decent understanding of how the geographical and physical factors can influence the effective use of user activities in urban spaces and has also detected the importance of these aspects. However, at the same time, the pilot study is still limited in terms of statistical power by the limitation of sample size and this may affect the accuracy of the results. For this reason, the investigation will be continued in the future study with a bigger sample size to outline a guide for the urbanists on how the design attributes can impact users of urban space through daily activity in Iraqi squares with the critical aspects conducted in this study.

REFERENCES

- Al-Hashimi, F. W. (2016). *The hidden face of Erbil: change and persistence in the urban core* (Doctoral dissertation, Nottingham Trent University).
- Almohannadi, M., Zaina, S., Zaina, S., & Furlan, R. (2015). Integrated Approach for the Improvement of Human Comfort in the Public Realm: The Case of the Corniche, the Linear Urban Link of Doha. *American Journal of Sociological Research*, 5(4), 89–100. <https://doi.org/10.5923/j.sociology.20150504.01>
- Askari, A. H., & Soltani, S. (2018). Determinants of a successful public open space: the case of Dataran Merdeka in the city centre of Kuala Lumpur, Malaysia. *Landscape Research*, 6397, 1–12. <https://doi.org/10.1080/01426397.2018.1427221>
- Balsas, C. J. L. (2007). City centre revitalization in Portugal: A study of Lisbon and Porto. *Journal of Urban Design*, 12(2), 231–259. <https://doi.org/10.1080/13574800701306328>
- Carmona, M. (2019). Principles for public space design, planning to do better. *Urban Design International*, 24(1), 47–59. <https://doi.org/10.1057/s41289-018-0070-3>

- Carmona, M., Tiesdell, S., & Heath, T. (2003). *Public Places - Urban Spaces*. London: Architectural Press.
- Carr, S., Francis, M., Rivlin, L. G., & Stone, A. M. (1992). *Public Space*. Cambridge: Cambridge University Press.
- Cervero, R., & Kockelman, K. (1997). travel demand density, diversity and design Cervero 1997.pdf, 2(3), 199–219. [https://doi.org/10.1016/S1361-9209\(97\)00009-6](https://doi.org/10.1016/S1361-9209(97)00009-6)
- Chacón-Borrego, F., Corral-Pernía, J., Martínez-Martínez, A., & Castañeda-Vázquez, C. (2018). Usage Behaviour of Public Spaces Associated with Sport and Recreational Activities. *Sustainability*, 10(7), 2377. <https://doi.org/10.3390/su10072377>
- Chen, J., & Chang, Z. (2015). Rethinking urban green space accessibility: Evaluating and optimizing public transportation system through social network analysis in megacities. *Landscape and Urban Planning*, 143, 150–159. <https://doi.org/10.1016/j.landurbplan.2015.07.007>
- Cherulnik, P. D. (1993). *Applications of Environment-behavior Research: Case Studies and Analysis*. Cambridge: Cambridge University Press.
- Dobbins, M. (2009). *Urban Design And People*. John Wiley & Sons, Inc. <https://doi.org/10.1017/CBO9781107415324.004>
- Douglas, O., Lennon, M., & Scott, M. (2017). Green space benefits for health and well-being: A life-course approach for urban planning , design and management. *Cities*, 66, 53–62. <https://doi.org/10.1016/j.cities.2017.03.011>
- Ewing, R., & Handy, S. (2009). Measuring the Unmeasurable: Urban Design Qualities Related to Walkability. *Journal of Urban Design*, 14(1), 65–84. <https://doi.org/10.1080/13574800802451155>
- Gehl, J. (2007). Public spaces for a changing public life. In C. W. Thompson & P. Travlou (Eds.), *Open Space: People Space* (1st Ed. p. 8). Oxon & New York: Taylor & Francis.
- Giles-Corti, B., Broomhall, M. H., Knuiiman, M., Collins, C., Douglas, K., Ng, K., ... Donovan, R. J. (2005). Increasing walking: How important is distance to, attractiveness, and size of public open space? *American Journal of Preventive Medicine*, 28(2 Suppl. 2), 169–176. <https://doi.org/10.1016/j.amepre.2004.10.018>
- Gregory, D., Johnston, R., Pratt, G., Watts, M., & Whatmore, S. (2011). *The Dictionary of Human Geography*. West Sussex :John Wiley & Sons.
- Guilbert, A., De Cremer, K., Heene, B., Demoury, C., Aerts, R., Declerck, P., ... Van Nieuwenhuysse, A. (2019). Personal exposure to traffic-related air pollutants and relationships with respiratory symptoms and oxidative stress: A pilot cross-sectional study among urban green space workers. *Science of The Total Environment*, 649, 620–628. <https://doi.org/10.1016/j.scitotenv.2018.08.338>
- Habibi, M., Farahmandian, H., & Mojdehi, R. B. (2016). Reflection of urban space in Iranian cinema. A review of the last two decades. *Cities*, 50, 228–238. <https://doi.org/10.1016/j.cities.2015.07.005>
- Hass-Klau, C. (1999). *Streets as living space*. London : Landor Publishing.
- Herbst, H., & Herbst, V. (2006). The development of an evaluation method using a geographic information system to determine the importance of wasteland sites as urban wildlife areas. *Landscape and Urban Planning*, 77(1–2), 178–195. <https://doi.org/10.1016/j.landurbplan.2005.02.005>
- Hill, R. (1998). What Sample Size is “Enough” in Internet Survey Research? *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century*, 6(3–4), 1–10. Retrieved from <http://www.reconstrue.co.nz/IPCT-J Vol 6 Robin hill SampleSize.pdf>
- Hillier, B., Burdett, R., Peponis, J., & Penn, A. (1987). Creating life: or, does architecture determine anything? In *Architecture et Comportement/ Architecture and Behaviour* (pp. 233–250).
- Hjort, M., Martin, W., Stewart, T., Troelsen, J., Hjort, M., Martin, W. M., ... Troelsen, J. (2018). Design of Urban Public Spaces: Intent vs. Reality. *International Journal of Environmental Research and Public Health*, 15(4), 816. <https://doi.org/10.3390/ijerph15040816>
- Houtsma, M. T. (1993). E. J. Brill’s *First Encyclopaedia of Islam*, 1913–1936. Brill. <https://doi.org/10.1057/s41289-018-0069-9>
- Isaac, S., & Michael, W. B. (1995). *Handbook in research and evaluation : a collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences*. EdITS. Retrieved from
- Ja’afar, N. H. (2018). Landscape Features and Traditional Streets Character in Malaysia. *Asian Journal of Environment-Behaviour Studies*, 3(8), 121. <https://doi.org/10.21834/aje-bs.v3i8.285>
- Ja’afar, N.H., Asiah A.R., Nur Amirah A.S., Che Raikandar C. R. (2017). Sidewalk Accessibility at Melakas Traditional Streets for People with Disabilities (PwDs). *Planning Malaysia Journal*, 15(1).
- Jacobs, A. B. (1993). *Great Streets*. Cambridge: MIT Press.
- Johanson, G. A., & Brooks, G. P. (2010). Initial scale development: Sample size for pilot studies. *Educational and Psychological Measurement*, 70(3), 394–400. <https://doi.org/10.1177/0013164409355692>
- Johns, R. (2005). One Size Doesn’t Fit All: Selecting Response Scales For Attitude Items. *Journal of Elections, Public Opinion & Parties*, 15(2), 237–264. <https://doi.org/10.1080/13689880500178849>
- Kim, J. (2017). Comparing the Influences of the D/H Ratio, Size, and Facade Design of an Enclosed Square on Its Perceptual Qualities as a Sustainable Urban Space in South Korea. *Sustainability*, 9(4), 675. <https://doi.org/10.3390/su9040675>
- Klingemann, H., Scheuermann, A., Laederach, K., Krueger, B., Schmutz, E., Stähli, S., ... Kern, V. (2018). Public art and public space – Waiting

- stress and waiting pleasure. *Time and Society*, 27(1), 69–91. <https://doi.org/10.1177/0961463X15596701>
- Krier, R. (1979). Urban Space. https://doi.org/umkc_nichols_na9053_s6K74131979b
- L.Oxford, R., & A.Burry-Stock, J. (1995). Assessing The Use Of Language Learning Strategies Worldwide With The Esl/Efl Version Of The Strategy Inventory For Language Learning (SILL). *Neuroepidemiology*, 23. <https://doi.org/10.1159/000104095>
- Lang, J. (2017). *Urban Design: A Typology of Procedures and Products*. Oxon & New York : Taylor & Francis.
- Lynch, K., & Hack, G. (1984). Site planning. Cambridge : MIT Press.
- Lynch, K. (1984). *Good City Form*. Cambridge : MIT Press.
- Madanipour, A. (1996). *Design of Urban Space: an inquiry into a socio-spatial process*. John Wiley & Sons.
- Madanipour, A. (2004). Marginal public spaces in European cities. *Journal of Urban Design*, 9(3), 267–286. <https://doi.org/10.1080/1357480042000283869>
- Madanipour, A. (2007). Designing the City of Reason. Routledge. <https://doi.org/10.4324/9780203962138>
- Maslow, A. H. (1970). *Motivation and personality*. Harper & Row, Publishers.
- Mehta, V. (2014). Evaluating Public Space. *Journal of Urban Design*, 19(1), 53–88. <https://doi.org/10.1080/13574809.2013.854698>
- Mehta, V. (2018). Streets and social life in cities: a taxonomy of sociability. *Urban Design International*, Volume 24, 16-37 (2019)
- Moughtin, C. (2003). *Urban Design: Street And Square* (Third, Vol. 1). <https://doi.org/10.1017/CBO9781107415324.004>
- Nakau, M., Imanishi, J., Imanishi, J., Watanabe, S., Imanishi, A., Baba, T., ... Morimoto, Y. (2013). Spiritual care of cancer patients by integrated medicine in urban green space: A pilot study. *Explore: The Journal of Science and Healing*, 9(2), 87–90. <https://doi.org/10.1016/j.explore.2012.12.002>
- Nicholls, S. (2001). Measuring the accessibility and equity of public parks: a case study using GIS. *Managing Leisure*, 219, 201–219. <https://doi.org/10.1080/13606710110084651>
- Pancholi, S., Yigitcanlar, T., & Guaralda, M. (2015). Public space design of knowledge and innovation spaces: learnings from Kelvin Grove Urban Village, Brisbane. *Journal of Open Innovation: Technology, Market, and Complexity*, 1(1), 13. <https://doi.org/10.1186/s40852-015-0015-7>
- Pressman, N. (1994). Climatic factors in play areas and public space. *Architecture et Comportement*, 10(4), 83–93.
- Project for Public Spaces. (2008). *Streets as spaces. Pace Pacing And Clinical Electrophysiology*. Retrieved from http://www.pps.org/pdf/bookstore/Using_Streets_to_Rebuild_Communities.pdf
- Rapoport, A. (1990). *The Meaning of the Built Environment*. Tucson: University of Arizona Press.
- Rasul, A., Balzter, H., & Smith, C. (2017). Applying a normalized ratio scale technique to assess influences of urban expansion on land surface temperature of the semi-arid city of Erbil. *International Journal of Remote Sensing*, 38(13), 3960–3980. <https://doi.org/10.1080/01431161.2017.1312030>
- Shaftoe, H. (2008). *Convivial Urban Spaces, Creating Effective Public Places*. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Thompson, C. W. (2013). Activity, exercise and the planning and design of outdoor spaces. *Journal of Environmental Psychology*, Volume 34, Pages 79-96. Retrieved from <https://doi.org/10.1016/j.jenvp.2013.01.003>
- Treece, E. M. W., & Treece, J. W. (1977). *Elements of research in nursing*. Mosby.
- Van Hecke, L., Deforche, B., Van Dyck, D., De Bourdeaudhuij, I., Veitch, J., & Van Cauwenberg, J. (2016). Social and physical environmental factors influencing adolescents' physical activity in urban public open spaces: A qualitative study using walk-along interviews. *PLoS ONE*, 11(5), 1–24. <https://doi.org/10.1371/journal.pone.0155686>
- Walker, R. B., & Hiller, J. E. (2007). Places and health: A qualitative study to explore how older women living alone perceive the social and physical dimensions of their neighbourhoods. *Social Science and Medicine*, 65(6), 1154–1165. <https://doi.org/10.1016/j.socscimed.2007.04.031>
- Wang, D., Brown, G., & Liu, Y. (2015). The physical and non-physical factors that influence perceived access to urban parks. *Landscape and Urban Planning*, 133, 53–66. <https://doi.org/10.1016/j.landurbplan.2014.09.007>
- Whyte, W. H. (1980). *The Social Life Of Small Urban Spaces*. The Conservation Foundation Washington, DC.
- Worpole, K., & Knox, K. (2007). *The Social Value of Public Spaces*. Joseph Rowntree Foundation.
- Yeang, Llewelyn Davies. (2000). *Urban Design Compendium. Homes and Communities Agency*.